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JANUARY QUARTERLY (AND ANNUAL) MEETING

OF THE

Massachusetts Association of Boards of Health.

The quarterly (and annual) meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boston, on Thursday, January 29. Dinner was served at 1 P.M.; and after dinner a business meeting was held under the presidency of Dr. H. P. Walcott, officers for the ensuing year were elected, and papers were read and discussed.

On motion of Dr. Hill the reading of the records of the October meeting was dispensed with.

Mr. E. L. Pilsbury, of Boston, Dr. L. M. Palmer, of South Framingham, and Dr. J. Arthur Gage, of Lowell, were appointed a committee to nominate officers for the coming year.

Members of the Association were elected as follows, upon the recommendation of the Executive Committee: —

FRANK E. WINSLOW, of Chelsea.
CHARLES M. HARGRAVES, of Framingham.
Dr. VICTOR A. REED, of Lawrence.
Dr. JOHN W. PRATT, of Dedham.
ALLEN F. CARPENTER, of Somerville.
EDMUND S. SPARROW, of Somerville.
Dr. A. A. MACKEEN, of Whitman.
GEORGE J. HEBERT, of Palmer. (P. O. Address Three Rivers, Mass.)

Dr. James B. Field, of Lowell, presented his report as Treasurer. It was as follows: —

TREASURER'S REPORT FOR 1902.

Receipts.

Balance from 1901		$1,202.82
Interest on deposits, 2 years	$65.25	
Assessments for 1898, 1899, 1900	4.50	
Assessments for 1901	21.00	
Assessments for 1902	315.00	
Assessments for 1903	10.63	
Total receipts		416.38
		$1,619.20

Expenses.

Printing	$28.25	
Postage	38.50	
Cigars and dinners for guests	34.25	
Clerical assistance	9.25	
Treasurer's bond	4.00	
Travelling expenses of speaker	20.00	
Plates and typewriting for Diphtheria Committee	44.50	
Purchase of 2,000 old *Journals*	8.00	
Report of meetings	116.30	
Publishing *Journal*	393.90	
Total expenses		$696.95
Balance to 1903		922.25
		$1,619.20

Respectfully submitted,

JAMES B. FIELD,
Treasurer.

Examined and approved as correctly cast and properly vouched for.

J. ARTHUR GAGE,
Auditor.

DR. FIELD.— You will see by this report that the expenses in 1902 were $280 in excess of the receipts. This was due to the fact that the Association was obliged to publish its own journal. Even with an increase of the annual dues to $2, assuming that the membership held the same, there will be a deficiency of $240 next year, unless our Publication Committee is enabled to make some arrangement for publishing the *Journal.* This, I am assured, the Publication Committee is trying earnestly to do.

The report was received, and placed on file.

DR. DURGIN.— Notice was given at the last meeting that a motion would be made at this meeting, in accordance with the By-laws, for an increase of the dues from $1.50 to $2. This becomes necessary principally because we must aid in the publication of the *Journal.* You have seen proof of that from the reading of the Treasurer's Report. I now make this motion that the dues be increased from $1.50 to $2.

The motion was seconded and adopted.

DR. DURGIN.— It might be interesting to say, in connection with this rise in the dues, that, when the Association began eleven years ago, the dues were made $3. They were then gradually reduced until they got down to $1.50. This was made possible by a favorable contract which had been made for the publishing of the *Journal.* The publishers failed up, and threw the *Journal* upon the hands of the committee. The Publishing Committee has done the best it could in getting the work out without using up the treasury too badly. Unfortunately, there have been some of the most expensive numbers published since this failure of the publishers. We expect to make another contract very soon.

THE PRESIDENT.— Mr. Pilsbury, is your committee prepared to report?

MR. PILSBURY.— Mr. President, the committee recommends that the Association elect the board of officers as now constituted, with the exception of one member of the Executive Committee, W. H. Chapin, of Springfield, who is not now a member of the Association. The committee offers in lieu of Dr. Chapin the name of Dr. Herbert C. Emerson. Otherwise, the list will be as it has been during the past year. To save time, the committee will not read the list. I move that the Secretary be delegated to deposit one ballot as representing the sentiment of the Association for the list presented.

The motion was adopted, and the Secretary cast the ballot.

THE PRESIDENT.— The Secretary reports that he has cast the ballot that he was authorized to cast, and that the gentlemen named by your Nominating Committee have been duly elected officers of this

Association for the ensuing year. For my own part in it, gentlemen, I thank you most heartily.

The regular business of the afternoon is, first, a paper on "The Outbreak of Foot-and-mouth Disease in New England," by Dr. D. E. Salmon, of Washington, D.C. I now have the pleasure of introducing Dr. Salmon.

THE PRESENT OUTBREAK OF FOOT-AND-MOUTH DISEASE IN THE NEW ENGLAND STATES.

BY D. E. SALMON, D.V.M., CHIEF OF THE UNITED STATES BUREAU OF ANIMAL INDUSTRY.

Mr. President, Ladies and Gentlemen,— I must confess that it was with some hesitation that I accepted the invitation to present a paper to this distinguished body. I did think before I came up here to try to control this outbreak of disease that I knew something about foot-and-mouth disease; but it has been impressed upon me during the past few weeks that I ought to speak with considerable humility in regard to a subject of this kind. However, I trust to your consideration as medical men and sanitarians to overlook any deficiencies which may appear in my brief paper.

The unexpected outbreak of foot-and-mouth disease which began in this State about August of last year, and extended to the States of New Hampshire, Vermont, and Rhode Island, has awakened especial interest in this disease, its nature, characteristics, and effects. This is my reason for consenting to read a short paper before this meeting upon a subject which, at first sight, might appear to be somewhat foreign to its work and purposes.

Foot-and-mouth disease, or epizoötic aphtha, has been known to the veterinarians and agriculturists of Europe since the time when, with advancing medical knowledge, it was possible to discriminate between the different plagues of animals. It has been more or less constantly present in the countries of Europe, particularly those of the continent, but has only appeared in America a few times. In 1870 there was a rather extensive outbreak, affecting the New England States and New York. The type of the disease at that time

was mild, and the dissemination of the contagion was quite easily arrested. About 1880 there were two or three lots of cattle and sheep brought to the United States affected with this disease, but there was no extension from the animals originally affected. In 1884 there was a small outbreak at Portland, Me., caused by imported cattle; and the disease spread to a few herds outside of the quarantine station. Owing to the small number of animals affected and the limited area of territory covered by the disease, it was easily controlled by the ordinary measures of quarantine and disinfection.

In general, foot-and-mouth-disease begins with an elevation of temperature amounting to from two to six degrees Fahrenheit, and the formation of vesicles in the mouth, upon the udder and teats, and on the feet. These vesicles are of various sizes, the epidermis being raised by a clear exudate which soon escapes by the rupture of the membrane. The membrane covering the vesicles is torn away by abrasion of the parts, or hangs in shreds, leaving a raw, ulcerated surface which is extremely sensitive. When the vesicles appear in the mouth, there is considerable salivation, the saliva gathering in a white foam about the mouth and attracting the attention of the observer. This is one of the first symptoms, and the salivation may be so abundant as to saturate the hay and floor in front of the affected animal. Affected cattle may also make a peculiar smacking sound with the mouth, which is no doubt due to the soreness of the tongue or adjacent parts. When the vesicles appear about the feet, the animals may be seen to raise and shake the posterior extremities in a manner which indicates the pain that they feel in the affected regions. Large vesicles appear upon the udder and teats, which interfere seriously with milking, and from which secretions issue which may contaminate the milk at the time it is drawn. There is often congestion of the mammary glands, with induration and the formation of abscesses.

The acute stage of the disease is generally terminated within a period of two weeks, after which time convalescence occurs with more or less rapidity, according to the conditions of existence, and the extremes of temperature to which the animals are subjected.

The disease is not one which produces a high fatality. The average loss by death in European countries has been from 2 to

5 per cent. The actual losses of cattle owners are, however, much greater than this. The high fever causes a rapid loss of flesh, which loss is augmented by the fact that, owing to the large vesicles and resulting ulcers in the mouth, the animals are not able to masticate their food. On account of this loss of flesh their value is decreased from 20 to 25 per cent. At the same time the milk secretion almost disappears, and the owner loses all revenue from his animals for from four to six weeks. When the animals have recovered from the acute form of the disease, many of them are found to be more or less injured, some of them having lost the horn from their feet, others having ulcers of the feet which cause chronic lameness, a considerable proportion having abscesses in the udder, which make them worthless for milk production, while numerous others abort and become emaciated and of little value. On the whole, I think, it is probably not far from correct to estimate that in an outbreak such as we now have in Massachusetts the average loss on account of the disease equals 50 per cent. of the value of the cattle affected.

A number of herds have been preserved, which had the disease in a mild form and which had apparently recovered at the time our inspection was made. In about one-third of these the owners have since come to us with the statement that a relapse had occurred with their animals: some were again affected with the formation of vesicles, and most of the others had abscesses in the udders which made them unfit for milk production. At the time these cattle were slaughtered the udders of many of them were so distended with pus that they were ruptured as the animals fell, and discharged vast quantities of this liquid, showing that they had been practically converted into sacs of pus.

Now a few words as to the management of the present outbreak. Some persons more or less acquainted with the history of the disease and the methods of handling it abroad have expressed surprise that I should have adopted such a radical plan as the slaughter of all diseased herds.

The measures which are indicated for controlling a disease of this kind must necessarily vary more or less according to the conditions which are found to exist. Foot-and-mouth disease is one of

the most contagious of the diseases of animals, there being no other except rinderpest that equals it. It is therefore extremely difficult to confine the contagion by quarantine. Persons, animals, or even birds, going from infected premises to other places where cattle are kept, carry the contagion, and thus cause the disease to spread with surprising rapidity. There are few cases where the disease has succeeded in disseminating itself to any extent where an outbreak has been arrested by quarantine. An example of this is seen in the recent spread of the disease over the continent of Europe. It has invaded nearly or quite every country on the continent, and has remained for four or five years, notwithstanding the application of quarantine and the ordinary sanitary measures.

The present outbreak in Massachusetts has been one of the most virulent of which I have any knowledge. It has spread with extreme facility, and has affected all of the cattle in the infected herds in a very few days; while the fever has been very high, the loss of flesh extreme, and the after results very unfavorable. At the time of my arrival in this State there were at least 100 herds affected in Massachusetts and a considerable number in both Rhode Island and Vermont. Newly infected herds were being found daily, and the disease was spreading with alarming rapidity. The map which I show you, and which covers Massachusetts, Rhode Island, Connecticut, and the lower part of New Hampshire and Vermont, will give you an idea of the dissemination of the contagion. You see by these pins with red heads the towns that have been affected with the disease. In some cases there are quite a number of herds for each pin: in other cases one pin represents a herd. There were four herds in New Hampshire, at three different places, Hudson, Hancock, and Salem; and then there was an outbreak in the neighborhood of Chester, Vt., farther up in the State than would appear from this exhibit. By far the greater number of cases, however, were in Eastern Massachusetts, as shown by these pins. By the aid of this map you can all, I think, get an idea of the territory that has been affected and of the distribution of the disease.

It was plain that nothing but the most prompt and radical measures would be sufficient to confine the disease to the territory then infected. We could not for a moment contemplate the idea of allow-

ing the disease to spread over the whole State and much less over the whole United States. In the State of Massachusetts alone there are 300,000 head of cattle which would be affected, at an average loss of something like $15 per head, making, all told, a loss for the State of between four and five millions of dollars, without considering the loss to commerce which would result from the continuance of quarantine restrictions for three or four years, and the losses which would occur by the disease being transmitted to other species of animals, such as sheep and swine.

The presence of the disease has made it necessary to close the port of Boston to export animals and prohibit the shipment of cattle, hides, and various other articles of commerce from Massachusetts to other States. If the disease should escape from control and spread over this State, the fear that it would cause in other States would lead to a great extension of the quarantine restrictions and heavy losses from interference with commerce. If the disease should escape from the New England States and spread over the country, affecting all the cattle, the losses would be tremendous, and would constitute a national calamity. A thousand million dollars would not be too high an estimate.

I have inserted a table which shows the number of herds and animals affected up to the present time and the number which have been slaughtered. With the slaughtering of the diseased animals the extension of the contagion has been arrested in Vermont, New Hampshire, and Rhode Island, and in all parts of Massachusetts except a small section south of Boston, where newly affected herds are still being found.

State.	*Total Affected since Appearance of Disease.*		*Slaughtered up to Date (Jan. 20, 1903).*			
	Herds.	*Cattle.*	*Herds.*	*Cattle.*	*Swine.*	*Sheep and Goats.*
Massachusetts	143	2,727	113	2,340	217	47
Vermont	21	335	21	335	54	74
Rhode Island	17	367	4	75	8	—
New Hampshire	4	37	4	37	—	—
Total	185	3,466	142	2,787	279	121

You will see from this that, unless it should happen that we discover some newly infected district, or it is much more difficult to

eradicate the disease in the small territory in which it still lingers than is anticipated, we shall be able to eradicate it at an expense probably not exceeding $250,000 or $300,000.

There remains for us to consider the matter briefly from the public health standpoint. What is the effect of this disease on the consumer of animal products, and what would be the effect of an extension of the disease to all parts of the country?

Fortunately, the disease is only rarely conveyed to the human subject. In all extensive outbreaks, however, more or less cases are reported where the contagion has affected human beings, especially children, and in some cases with fatal results. However, no bad results appear to come from the meat of diseased animals, probably because cooking destroys the contagion; and it is believed the milk is not dangerous if pasteurized.

The disease spreads so rapidly and affects such a large proportion of the cattle that, when uncontrolled, it causes great shortage of the milk supply and suffering on that account. Doubtless, also, there are more or less serious digestive troubles caused by the pus contained in the milk, which reaches this product either from the ulcers on the teats or the abscesses in the udder or by contamination with the discharges from the vagina which are a consequence of abortion. To what extent the contamination of milk with pus and the various microbes which it may contain affects the health of the consumer is a question for the practising physician and the sanitarian to answer.

Under any circumstances, disease among food-producing animals is a serious subject from a sanitary point of view. Any disease accompanied by a high fever, which spreads so rapidly as to affect all the animals of one or more species, making it impossible under certain conditions to obtain meat or milk from unaffected animals, is a matter which must cause grave concern. Every shortage of the food supply must increase the misery and disease of the poorer classes in our large cities; and the sanitarian is therefore interested in maintaining both an abundant supply of food and one which is uncontaminated by disease, whether the specific affection is or is not communicable to the human consumer of animal products.

Gentlemen, I thank you for your attention. [Applause.]

THE PRESIDENT.— Dr. Salmon's very interesting and authoritative paper upon this subject is before you for discussion. Dr. Peters, what have you to say about the matter?

DR. PETERS.— Mr. Chairman and gentlemen, I think that after the interesting paper Dr. Salmon has given us there is very little to say. This outbreak was first called to my attention about November 12; and the first I heard of it was out of Massachusetts, in Rhode Island. I wrote to Dr. Salmon at the time, telling him what I had heard, and that I would investigate matters further, and, if anything more developed on investigation, I would notify him in another letter. A few days after that, about the middle of November, the disease was called to my attention in Dedham; and I telegraphed him at once. After agents of the Bureau of Animal Industry had verified my diagnosis, Dr. Salmon established headquarters here, and has been co-operating with the State authorities and doing all that he possibly could to eradicate the disease since that time.

A good many of you may remember that we had foot-and-mouth disease in this country about thirty years or a little more ago. In 1870 and 1871, I think, there was an outbreak that spread over a large portion of New England. Dr. Abbott gave me a report of the State Board of Health the other day — it was for 1871 — in which there was reference to an article by one of the Dr. Marions, of Allston, in which Dr. Marion speaks of a number of cases occurring in his practice among people who had milk from cows in certain herds in Brighton. It is a very interesting article.

I have heard of very little trouble from foot-and-mouth disease among people during this outbreak. I don't know of any authentic cases from it. I think, perhaps, one reason is that the present State law provides that, where cattle are quarantined as having contagious disease, the owner may be forbidden to sell the milk from the cows, and, wherever a herd was quarantined, the owner was forbidden to sell the milk. The result has been that very little milk — practically none — has reached the market from cattle with foot-and-mouth disease; and hence there seems to have been very little likelihood of cases among humans as the result of this outbreak among cattle.

The law also provides that, where any one has animals quarantined on his premises and is forbidden to sell the product, he must keep the animals at his own expense for ten days. After ten days the owner is entitled to remuneration from the State in a reasonable sum for the expense of maintaining the animals. I have now in the office of the Cattle Bureau claims from owners of cattle for about $5,000 for keeping animals, and there are other claims to come in, that will probably amount to $3,000 or $4,000 more. So the board bill on these animals to the State will be $8,000 or $9,000. Perhaps the owner, having this to console him, has in a measure been compensated for being deprived of the proceeds of the sale of the milk, and possibly that has had something to do with making him careful not to sell milk. Certainly, there seems to have been very little complaint from this outbreak as to its danger to the public health, which of course is the standpoint from which this Association views it. It also has its commercial aspect, the dollars-and-cents point of view, which is very important.

I think, Mr. President, it would be very interesting to hear from Dr. Marion his experience at the time of the other outbreak.

THE PRESIDENT.— It is not always that we can find an offender that co mmitted his offence thirty years ago. When we do find him he is not likely to be as young a man as Dr. Marion.

DR. HORACE E. MARION.— Mr. President and gentlemen, I had, forgotten entirely that I was ever so foolish as to write an article for the Board of Health; but I do remember distinctly that in 1870 or 1871, which was the first year of my going into practice, I saw a family where I could trace the trouble I was called to treat to nothing else than the foot-and-mouth disease. Not being willing to risk my own observations, I called into council Dr. Arthur H. Nichols, then of Roxbury, now of the city proper; and, if I wrote anything that was of any worth then, it was in all probability due to Dr. Nichols's pushing me on. This family was affected with an eruption in the mouth, very much like herpes, and herpetic eruption on different parts of the body. They were ailing about two weeks, and gradually got over the disease. I don't remember any special thing about it, except this eruption and tracing it to a diseased herd.

THE PRESIDENT.— If any gentleman present has anything to contribute on this subject, the Association would be very glad to hear it.

DR. BURR.— Mr. President, I cannot help feeling that this State is under great obligation to Dr. Salmon and his bureau, working in connection with the Cattle Bureau of this State, for arresting the outbreak of this disease. There has been a great deal of comment upon the method pursued, but I cannot conceive of any practical way that we could have stopped the spread of this disease into other States excepting by these radical measures that have been taken by Dr. Salmon. We have been fortunate in Boston in having only one herd affected. I don't know why we have been favored so, because we have been right in the midst of it. I rather hoped that Dr. Salmon would tell us something about the after-treatment of these cases; that is, disinfection of the barns and treatment of the grounds around them. There has been talk about quarantining these animals upon the premises. All of us who have had experience in quarantining patients in houses, etc., know how difficult it is to maintain quarantine; and it must be a great deal harder to quarantine upon farms. I know that it was very difficult to keep people away from the small herd that we had in Boston; and I cannot conceive of any way that we could have stopped the spread of the disease — that is, carrying it from one barn to another — except by the measures taken by the United States Bureau of Animal Industry and the Cattle Bureau of Massachusetts.

MR. C.-E. A. WINSLOW.— I should like to ask one or two practical questions, if I may, that I know are of great interest to those living in the infected districts. In the first place, I should like to ask as to the transmissibility of the disease to horses, dogs, and cats; in the second place, as to the incubation period of the disease in animals which are susceptible to it; and, in the third place, as to the length of time for which it is necessary to quarantine animals not susceptible to the disease, but which have been exposed to it, before they can be allowed to go free.

DR. SALMON.— That is a question I cannot answer. There have been a number of people who have isolated different causes for it. As far as I am concerned, I have not had any investigations made in

this country, because I did not care to take the chances of spreading the disease. Our people at Washington did desire to make some cultures and inoculations; but I preferred to let them investigate the disease in Europe, where they have more of it.

It is believed that horses take the disease in a mild form. I have never seen any horses affected with it; and there have been none in this outbreak, so far as my information goes. The same is true of dogs and cats. These animals are principally dangerous in carrying the contagion in their fur and hair or on their feet, when going from infected premises to others. I think that small animals, such as cats and dogs, are more dangerous than is generally believed or understood. At one of the places where we killed a herd there were twelve or fifteen cats in the barn; and, in trying to identify these cats, it was found that they represented two or three different farms in the neighborhood. It has seemed that pigeons have had something to do in spreading the disease in this outbreak. The herd at the Concord Reformatory was a herd that was isolated; and there seemed to have been no communication established with outside premises, especially infected ones, except by pigeons. There were a great many pigeons around there, which fed part of the time about the stables in the Reformatory and part of the time at other stables in the neighborhood, where there were infected animals. Flying a short distance, probably half a mile or so, it is quite conceivable that they could carry the contagion as well as a person could who walked that distance. On premises where we are killing off a herd to-day there are probably two or three hundred pigeons which have been flying round the neighborhood, and we have stipulated that those pigeons should all be killed. In that section of the State, as I say, the disease has been kept up somewhat mysteriously. We have not been able to learn how the infection was carried. In some cases it seemed as though it was carried by cats and dogs, and in others it possibly has been carried by pigeons.

The period of incubation is quite short. In some cases it is not over two days, but it may be five or six days. It is always short. Disease comes on very suddenly in a herd. At the Concord Reformatory, for instance, on Saturday they had one case, on Sunday they had eight cases, and on Monday they had some thirty or forty

cases, in a herd of 58 animals. That is a fair illustration of the rapidity with which the disease goes through a herd.

Then as to the precautions which should be taken with insusceptible animals. We have endeavored where it was possible to disinfect such animals by washing them with a creoline solution and then keeping them away from infected premises. I think that that can be done readily with most animals.

THE PRESIDENT.— If there is nothing else to be said upon this subject, we will proceed to the next paper of the afternoon, a report by Dr. Hill, of Boston, on "Paratyphoid Fever."

A NOTE ON PARATYPHOID FEVER FROM THE PUBLIC HEALTH STANDPOINT.

BY HIBBERT WINSLOW HILL, M.D., DIRECTOR, BOSTON BOARD OF HEALTH LABORATORY.

One hundred years ago typhoid fever was not recognized as a distinct disease, but, when encountered, as it must often have been, was considered a form of typhus fever. It is a little difficult in these days to understand how typhus fever and typhoid fever were ever confused, although there is a more modern example in the case of certain throat affections. From some work done in the last few years, it would seem that even typhoid fever as commonly diagnosed clinically may be further subdivided.

The old idea of a disease was a condition presenting a certain set of symptoms. If a certain set of symptoms were present, and the physician could give the name by which that particular set of symptoms was commonly known, his diagnosis was made. Now, however, the effort is made to deduce from the symptoms and the history of the patient what the cause of the symptoms is, and, in the case of symptoms pointing to bacterial infection, to determine the exact organism concerned. Thus it is possible to know more exactly what is really the matter with the patient and what is most likely to aid his recovery. From the sanitarian's standpoint the identification of the

disease is necessary, that he may judge of the danger to the public health involved and take proper measures regarding it. The name of a disease, therefore, has come to stand for the results of the action of a certain cause rather than merely for a set of symptoms.

Until comparatively recently the diagnosis of typhoid fever has been a clinical matter, notwithstanding the fact that the bacillus of typhoid was known. This was because, although known, the bacillus is difficult to isolate with sufficient rapidity and certainty. The introduction of the Widal reaction furnished a bacteriological method easy of application,— a method which has been very widely adopted. Briefly, this method consists in taking a drop of blood from the ear or finger of the patient and testing it, not for typhoid bacilli, as is often supposed by the general public, but for the presence of a peculiar substance found only in the blood of true typhoid fever patients. The test for this peculiar substance is made by mixing the blood to be tested with a culture of typhoid bacilli, kept for this purpose in the laboratory. The typhoid bacilli, before the addition of the blood, swim freely about in the liquid culture. On adding the blood of a well person or of a sick person not affected by typhoid bacilli, the bacilli are not affected, but continue to swim about freely, as before. But, if the patient be suffering from true typhoid, his blood will contain the peculiar substance already referred to; and this acts at once on the bacilli. Under the action of this substance they move more and more slowly, gathering at the same time into little groups, so that finally one sees only a few motionless masses of bacilli drifting slowly with the current or lying quite still.

Now true typhoid fever yields this peculiar substance capable of acting on true typhoid bacilli in this way. But what is true typhoid fever? True typhoid fever is that disease caused by the true typhoid bacilli. But the practitioner finds cases which give all the symptoms of typhoid fever, running a fairly typical course, in which repeated tests show that the patient's blood has no effect upon the cultures of typhoid bacilli in the laboratory. Clinically, it is a case of typhoid: bacteriologically, it is not. In the last few years such cases have worried every one who has had to do with them.

Briefly stated, the typhoid bacillus is not the only bacillus which

can produce the symptoms of typhoid fever. There are other bacilli which affect man very much as the typhoid bacillus does. These are known by different names; but the paratyphoid fever group interests us particularly, because they are very much like the typhoid bacillus in nearly every way, as well as in the similarity of the diseases they produce. But, in spite of this likeness in so many ways, the blood of a patient infected with typhoid bacilli often will not affect cultures of paratyphoid fever organisms; nor will the blood of a paratyphoid fever patient, as a rule, affect cultures of typhoid bacilli. This depends somewhat on the dilution used. In low dilution all of this group tend to be "serum-identical"; *i.e.*, to be affected in the same way by the same blood. Now, since it has been customary to test the blood of suspected patients only with cultures of typhoid bacilli in routine work, the paratyphoid cases sent in to be tested are likely to give negative results. Wherever the blood test has been employed, then, in this limited way, true typhoid fever has been correctly diagnosed; but paratyphoid fever has been set down either as not typhoid at all or as clinical typhoid which refused to give the test reaction. Such merely clinical cases have been usually looked upon with doubt, especially when endeavoring to trace the course and source of an outbreak of typhoidal character.

Paratyphoid fever should be kept in mind by the professional hygienist. By whatever ways the typhoid bacillus may be distributed, by the same ways may the paratyphoid organisms be distributed. If an outbreak of true typhoid occurs, the health officer immediately considers all the possible sources of the bacilli, such as water, milk, foods, direct contact, etc. These same routes of infection must be considered for paratyphoid fever. In all outbreaks both diseases must be sought out. The tracing of outbreaks is really a high class of detective work, on which the safety of the public is often just as dependent as it is upon police detectives for protection in another direction. In guarding water supplies, milk supplies, etc., so far as concerns the principal criminal, the typhoid bacillus, best known and for whose identification there has been a definite test, a less important criminal, having practically the same stamping ground and committing very much the same sort of mischief, should not be overlooked.

SUMMARY.

Besides true typhoid fever there exists another disease very like it, caused by organisms very like the typhoid bacillus, but distinct from it.

These diseases may be distinguished from each other by the fact that each gives a reaction with the bacillus which causes it, and not with the other, if proper dilution be used.

Since both typhoid and paratyphoid fever have very much the same sanitary significance, both should be taken into account in dealing with these diseases against which protection depends on purity of water, milk, and raw foods.

THE PRESIDENT.— Dr. Hill's paper is now before you for discussion.

DR. DURGIN.— Mr. President, on the day of our last meeting, three months ago, there occurred reports of typhoid fever at a house in Columbus Avenue, Boston. Reports came over the telephone to me about eleven o'clock from the City Hospital concerning three or four cases that had been admitted. Suspicion at once rested upon this house and its restaurant in Columbus Avenue. There was something said at that meeting about boards of health barking up the wrong tree, etc., and that the board of health had examined the plumbing in this instance, and taken a sample of milk. I had known of this outbreak, then, about two hours. I made a few remarks concerning the matter at that time, and promised the Association I would report progress, not being able at that time to say more about it than that two experts had been put upon the case, and that they were then at work on it instead of coming to the meeting. In less than two hours after the investigation was begun, the clew was obtained; and in a few hours more the cause of the outbreak was clearly traced to its source. Two sisters were waitresses in a restaurant where the outbreak occurred, and both had typhoid fever. The first case (one of the waitresses) began in the first week in October. She continued to wait on the table until the 15th. She was then in bed until the 19th, when she was sent to the

hospital. The other sister nursed the first case until it was sent to hospital, and she also waited on table and washed dishes in the restaurant until she was sent to hospital with typhoid fever on the 29th of October.

On the very day that this came over the telephone to me, Drs. Shea and Burr traced the disease, and had the disinfection performed the same afternoon and everything cleaned up, so far as it was possible to do it. I want to say once more that the board of health in question has never in its history looked for typhoid fever by any examination of the drainage or the plumbing; nor has it or any of its officers ever taken a sample of milk on account of typhoid fever. The fact that the drainage is examined where this disease exists has nothing whatever to do with the search for the cause of typhoid fever. There were, as a result of this infection, about 28 cases. They took their meals at this place in Columbus Avenue. Some were medical students, some were students at the Technology, and there were other boarders. The celery, which was mentioned to me over the telephone as being a common article used at the table, was considered; but neither this nor any other article of diet appeared as the common source of the trouble. The two waitresses were the undoubted source of the subsequent cases.

The question is asked as to the number of people who boarded at this place. I am not able to state what that was.

DR. SHEA.— Three hundred, doctor.

DR. DURGIN.— About three hundred boarded at the same restaurant.

MR. C.-E. A. WINSLOW.— I was extremely interested in Dr. Hill's admirable presentation of the work on paratyphoid fever; and I think it is of especial interest, taken in connection with the paper presented at the last meeting of this Association. The somewhat iconoclastic conclusions of Dr. Chapin have been well illustrated by this recent epidemic in Boston. We at the Institute of Technology have been inclined to feel that the old ideas as to the spread of typhoid fever must be modified under modern conditions in Massachusetts. The spread of typhoid fever by water mainly is a condition that prevails in uncivilized communities, in such communities as Philadelphia and Pittsburg, and, if Dr. Salmon will pardon me,

even in Washington. We have got by that here. The typhoid fever death-rate in Massachusetts is in almost every city and town in the State identical with that which occurs in communities having absolutely pure water supplies. We here must look for the source of typhoid fever epidemics mainly in personal infection, as it has been shown in this particular instance,— not in the water supply, not in the milk supply, except in isolated cases, but in the presence of persons carrying the disease.

I think Dr. Hill's paper indicates another point on which we must modify somewhat our preconceived ideas. The exaggerated importance of the agglutination reactions is a third fetich, which must, to a certain extent, follow the plumbing fetich and for us here the water-supply fetich. We have been attaching too much importance to the agglutination reactions as absolute diagnostic tests. They are undoubtedly of very great value, perhaps of greater value than any other single test. Dr. Hill probably remembers the paper presented at Washington by Dr. Bergey, of the University of Pennsylvania, in which he showed that a bacillus isolated from river water gave an almost perfect serum reaction for the Shiga bacillus, the bacillus which has been identified as the cause of some forms of dysentery, whereas it was a bacillus belonging to an entirely different group. By the serum reaction it would have been identified as the Shiga bacillus. So that we must regard these agglutination tests as only one link in the chain of evidence; and it is hardly, perhaps, safe now to define typhoid fever as the disease in which the blood of the patient will give a typical reaction with the typhoid bacillus. If we don't adopt that absolute arbitrary definition, of course it won't be necessary to class these cases as paratyphoid cases. We can call them all typhoid cases, some giving better and some less marked serum reactions. That will avoid the danger of overlooking the atypical cases which Dr. Hill has so well pointed out.

Dr. Hyde.— I just want to ask Dr. Durgin a question. In fact, I have asked him it. I understood him to say that he never looked to the milk supply in outbreaks of typhoid fever. Am I to infer from that, are we all to infer from that, that you do not consider, doctor, that with a milk route, or the milk from a herd of cattle, a person with typhoid may be capable of spreading the disease?

DR. DURGIN.— I understood you to ask me if we look in samples of milk for the typhoid bacilli, and I said no. I want to say, however, in regard to the rest of the question which you now ask that we do most certainly trace in every instance the milk supply to see if there is connected with it any case of typhoid fever, and that I regard milk as one of the common, and one of the most common, agents in the spread of typhoid fever.

DR. SHEA.— We in Boston have to deal with typhoid fever; and, as a rule, it is brought to us, imported from the outside. As health officers, when called to a case of typhoid fever, we never inquire about the water supply. Our first question is the milk; and, as a result of that question, I can recollect, in my experience of the past ten or twelve years, of running down probably a dozen or fifteen outbreaks of typhoid fever. Within three years we had an outbreak of 41 cases in West Roxbury. It was traced to a farm in Needham, and the people with the typhoid fever all obtained their milk from that particular place. When we have typhoid in a neighborhood, the milkman or contractor is under suspicion immediately; and many a day and night the inspectors of our department have travelled over New England, seeking the source of infection, and in the majority of cases with very good results. We find, in a little town or village, a man running a milk farm. His wife or some of the help have been sick with typhoid fever, and the conditions existing there all point with strong suspicion that the typhoid is coming to Boston in the milk from that farm. Again, 60 per cent. of the cases of typhoid fever that we have to deal with in Boston we find are contracted by the people that have been away on their vacations. They have been to the beach or the mountains. Of the other cases, I think it is fair to say that 15 or 20 per cent. can be directly traced to the milk supply.

It is a standing rule that, when a physician or a sanitary inspector is sent to investigate a case of typhoid fever, the question is immediately asked, "Where do you obtain your milk supply?" and if John Jones leaves milk to three or four families in the neighborhood, and there is typhoid in these families, we immediately find out where this milk is coming from, and, as a rule, we find the infection is in the milk.

And another regulation of the department that Mr. Jordan calls to my attention. After a case of typhoid fever is reported, the milkman of the party leaving the milk at the residence or store is immediately notified that "no cans, vessels, or bottles should be carried into or handled by any person living in said premises until the patient has recovered. If any milk is left at the premises it must be poured into a receptacle furnished by the family." I do not know how it is in other cities, but in Boston the milkman is always under suspicion with typhoid fever.

DR. SALMON.— Mr. President, perhaps I ought to say, in justice to Washington, where the water supply is to be more or less suspected as causing typhoid fever, that that is not as much of an indication of the uncivilized character of the inhabitants as it is in some other cities. Gentlemen will recall, I have no doubt, that in Washington we have not the advantage which you have in Massachusetts, of electing the people who legislate for us. We are obliged to accept legislators who are elected from all parts of the United States, some of them from Massachusetts [laughter and applause]; and, while they are a very intelligent and progressive set of gentlemen, they do not always agree with us in our views as to what they should do. We have for quite a number of years felt the necessity of improving our water supply. In fact, when I first secured the establishment of a bacteriological laboratory in Washington, which was one of the first in the country, I had some bacteriological analysis made of the water of the Potomac River, and concluded that the water was very bad for civilized people to drink. I expressed my opinion very freely, and saw that it reached members of Congress, who legislate for us; but they did not take the same view of it, and it has only been recently that we have impressed upon them the fact that their own health, as well as ours, depended upon improving the water supply. Recently we have had an appropriation, which is now being expended; and we hope to have a filtration plant in operation within the next few years at farthest.

MR. COFFEY.— The President has asked me to cite an instance that came under our observation at Worcester within a short time, that goes to prove that milk is a vehicle of contagion in typhoid. I want to say that in October of last year one of the inspectors reported

that two cases of typhoid existed on the route of a certain milkman. As is our custom, we immediately looked that milkman up. He lived in an adjoining town, some seven or eight miles away. We found a case of typhoid fever in his immediate family, convalescing. We also found a case of typhoid in a family on an adjoining farm, from which he received part of his supply. We immediately forbade their taking any more milk into the city, and had the cans and bottles thoroughly disinfected. No new cases appeared on that man's route. In all there were eleven cases, all of which dated prior to our discovery of the existence of the typhoid on the farm; and there were three deaths.

Two years ago we had a similar experience in another town adjoining the city, where we found by visiting the town that the milkman himself was down with the disease, and that on two farms, from which he received most of his supply, there were also cases. In that case we immediately shut off the supply of milk, and had the cans and bottles thoroughly disinfected; and no new cases resulted on that route subsequent to the time we discovered it.

Both of those instances have occurred very recently. One, as I say, was only last October: the other was about, I think, two years ago. Both of them go to prove, it seems to me, very conclusively that milk cannot be left out of account by any health officer in searching for the cause of typhoid fever.

DR. DENNY.— I should like to ask Dr. Hill if there are any cases on record where there have been epidemics of paratyphoid fever or where it is known that the disease spread from one case to another. I should also like to know what the *post-mortem* findings are.

DR. HILL.— The subject is so new that there is not a very extensive literature as yet, and there are not a great many (70–80) cases on record. For one thing, they have not heretofore been looked for systematically. But the history of the paratyphoid organism, so far as it has been worked out, justifies the conclusion that its history outside the body is very closely that of the typhoid bacillus. The autopsy findings are very varied, but in a general way similar lesions are presented as in true typhoid. The most striking fact is, of course, the absence of the true typhoid bacillus. Some years ago Dr. Councilman described to me a case which persistently refused

to give the Widal reaction. It came to autopsy, and presented at the autopsy lesions which would have justified any one in saying casually, "This, of course, is typhoid fever." However, the most careful search failed to reveal any typhoid bacilli anywhere. The very good reason for the absence of the Widal reaction was the fact that the typhoid bacillus was not present.

I should like to say something concerning one remark made by Mr. Winslow, relating to the names "typhoid" and "paratyphoid." It is all a question of definition and nomenclature. I think, however, that we are sufficiently far ahead now not to further confuse names and symptoms. Take tuberculosis, for instance. We now speak of tuberculosis as any form of disease caused by the bacillus tubercle. We do not now have half a dozen different names of supposedly different diseases; but we put all caused by the tubercle bacillus under one name, that of the organism which produces the disease. So I think that in typhoid fever we are perfectly justified in saying that true typhoid, whatever its exact symptoms, is that disease due to the true typhoid organism, and that a disease which is due to a different organism, never mind how closely similar to typhoid fever it may be, should have a different name, and that that other name should refer to the organism which produces it. It does not seem to me that we should go any further than we must in confusing nomenclature and facts. If we do distinguish paratyphoid and typhoid fever by name, yet recognize the fact that they must be very similarly dealt with, we have achieved two things. We escape from the error of believing that the two are distinct because the names are different, yet we do not confuse two things which are somewhat different because the names are the same.

MR. C.-E. A. WINSLOW.— Mr. Chairman, there is just one word more. Dr. Hill appears to have understood me as advocating the classing of diseases caused by different organisms under the same head merely because the symptoms are similar. My point only was that in respect to typhoid fever we are hardly in a position yet to say certainly that there are two distinct organisms or two distinct diseases; and, until we are sure of that, it is dangerous to introduce a confusion of terms.

DR. AGNES C. VIETOR.— Mr. President, I have been very much interested in the discussion on typhoid and paratyphoid fever, particularly because I have, in common with other practitioners, had cases of typhoid fever, clinical typhoid, that did not give the laboratory reaction. In reading a number of articles on this subject, within recent times, I was impressed with the resemblance of the problem to the problem of the streptococcus, on which I did a little work some time ago. To summarize what you are probably all familiar with, the streptococcus is open to question as to its identity and as to its behavior; that is, apparently the same streptococcus will, under differing conditions of culture, give different results, even in regard to the action of the antitoxine developed in the serum. In the study of the varying typhoid reactions, it has occurred to me that perhaps the typhoid bacillus resembles the streptococcus in these laboratory variations, and that the two varieties of paratyphoid bacilli, at present isolated, may be cultural variations of the typhoid bacillus.

THE ACTION OF VAPORIZED FORMALDEHYDE AND VAPORIZED CARBOLIC ACID AS GASEOUS DISINFECTANTS.

BY HIBBERT WINSLOW HILL, M.D., DIRECTOR BOSTON BOARD OF HEALTH LABORATORY.

Mr. President and Gentlemen,— By the kindness of your Programme Committee, I am allowed to make a brief statement of some recent results we have obtained in the Boston Board of Health Laboratory in testing formalin gas.

The points which are of especial importance are these: —

First, that, if the humidity of the air be low, in the room which is to be disinfected, very much more gas is required than if the humidity be at the saturation point. Formalin gas thus resembles sulphur, and high humidity is important in one case just as it is in the other.

Second, that a given amount of formalin gas, which in air of high humidity kills promptly, would, if placed in an equal quantity of

water, be practically inert. For instance, three ounces of formalin in one thousand cubic feet of air saturated with moisture will kill; but it would require from one to three thousand times as much formalin to kill in the same time if it were placed, not in one thousand cubie feet of air, but in one thousand cubic feet of water. Neither of these points is strictly new, but so far they have attracted little attention.

These considerations suggested to the writer that perhaps both of these principles might apply to disinfectants in general, and it was determined to try carbolic acid and other disinfectants on these lines. Carbolic acid solutions require about the same amounts of carbolic acid, in order to be effective, that formalin solutions must contain of formaldehyde to achieve the same results; and it seemed not unlikely that perhaps approximately equal amounts of their vapors might also be equally effective.

A series of experiments was begun. They are very far from completion yet; but we have got so far as to justify the statement that carbolic acid vaporized will kill the diphtheria bacillus in about the same time, and, roughly speaking, in about the same amount as will formaldehyde. Every one knows the disadvantages of formalin as well as its advantages. The use of carbolic acid vapor seems to get rid of the one, while preserving the other. High humidity is necessary in both cases; and the cost of carbolic acid is not greater practically, strength for strength, than that of formaldehyde.

Going somewhat further, we tried bichloride of mercury, which is volatile, and found that at saturation point its vapor also killed, so far as we have gone, somewhat better than formaldehyde. Whether bichloride is a practical thing to use for municipal disinfection we shall have to consider further, but in France it has been used in the form of a spray for some considerable time.

This work is only in the experimental stage as yet, but so far it seems to promise results of considerable advantage in the future.

Report of Committee on Diphtheria Bacilli in Well Persons.

The President.— Has the Committee on Diphtheria Bacilli in well persons anything to report in the way of a conclusion?

Dr. Hill.— Mr. President, this committee has reported already some nine months ago; and our conclusions have been in the hands of all the members for that period of time. I think it is hardly necessary to read them again now, but I will do so if you wish.

The President.— There is nothing additional to what has been already reported?

Dr. Hill.— Nothing additional, no. We consider that we have said about all that we could say in this report.

On motion of Mr. Coffey the report of the committee was accepted, and the committee was discharged from further consideration of the subject.

Adjourned.